
Small RNA and transcriptional upregulation.

Journal: Wiley Interdiscip Rev RNA

Publication Year: 2011

Authors: Victoria Portnoy, Vera Huang, Robert F Place, Long-Cheng Li

PubMed link: 21823233

Funding Grants: Induction of pluripotent stem cells by small RNA-guided transcriptional activation

Public Summary:

Small RNA molecules, such as microRNA and small interfering RNA, have emerged as master regulators of gene expression through their ability to suppress target genes in a phenomenon collectively called RNA interference (RNAi). There is growing evidence that small RNAs can also serve as activators of gene expression by targeting gene regulatory sequences. This novel mechanism, known as RNA activation (RNAa), appears to be conserved in at least mammalian cells and triggered by both endogenous and artificially designed small RNAs. RNAa depends on Argonaute proteins, but possesses kinetics distinct from that of RNAi. Epigenetic changes are associated with RNAa and may contribute to transcriptional activation of target genes, but the underlying mechanism remains elusive. Given the potential of RNAa as a molecular tool for studying gene function and cell reprogramming and also a therapeutic for disease, further research is needed to completely elucidate its molecular mechanism in order to refine the rules for target selection and improve strategies for exploiting it therapeutically.

Scientific Abstract:

Small RNA molecules, such as microRNA and small interfering RNA, have emerged as master regulators of gene expression through their ability to suppress target genes in a phenomenon collectively called RNA interference (RNAi). There is growing evidence that small RNAs can also serve as activators of gene expression by targeting gene regulatory sequences. This novel mechanism, known as RNA activation (RNAa), appears to be conserved in at least mammalian cells and triggered by both endogenous and artificially designed small RNAs. RNAa depends on Argonaute proteins, but possesses kinetics distinct from that of RNAi. Epigenetic changes are associated with RNAa and may contribute to transcriptional activation of target genes, but the underlying mechanism remains elusive. Given the potential of RNAa as a molecular tool for studying gene function and as a therapeutic for disease, further research is needed to completely elucidate its molecular mechanism in order to refine the rules for target selection and improve strategies for exploiting it therapeutically. WIREs RNA 2011 2 748-760 DOI: 10.1002/wrna.90 For further resources related to this article, please visit the WIREs website.

Source URL: <http://www.cirm.ca.gov/about-cirm/publications/small-rna-and-transcriptional-upregulation>